

1. A voltage boosting circuit comprising:
 - a first circuit, said first circuit having a first input connected to a reference voltage and a first output; and
 - a second circuit connected to receive the first output and a pre-charge voltage, said second circuit outputting a boosted output voltage on an output node based on the pre-charge voltage and the first output, said second circuit having a second node connected to a second input of the first circuit, said first circuit using a voltage on the second node and the reference voltage to generate the first output.
2. The voltage boosting circuit of claim 1, wherein the voltage on said second node is indicative of the boosted output voltage.
3. The voltage boosting circuit of claim 1, wherein the voltage on said second node is indicative of a difference between the boosted output voltage and the pre-charge voltage.
4. The voltage boosting circuit of claim 1, wherein the first output is a current based on a difference between the boosted output voltage and the reference voltage.
5. The voltage boosting circuit of claim 1, wherein said second circuit comprises a tracking capacitor connected between the output and second nodes, said tracking capacitor producing the voltage at the second node.

6. The voltage boosting circuit of claim 1, wherein said second circuit comprises:
 - a first capacitor connected between said pre-charge voltage and a third node connected to the first output; and
 - a second capacitor connected between the output node and the second node.
7. The voltage boosting circuit of claim 6, further comprising:
 - a first switch connected between the third node and a ground potential; and
 - a second switch connected between the second node and the ground potential,wherein in a pre-charge phase, said switches are closed to allow the capacitors to be pre-charged to the pre-charge voltage.
8. The voltage boosting circuit of claim 7, wherein in a boosting phase, said switches are open, preventing the capacitors from being pre-charged to the pre-charge voltage, said first capacitor being boosted by the first output to cause the boosted output voltage to be present at said output node.
9. The voltage boosting circuit of claim 1, wherein said first circuit comprises a voltage-to-current converter circuit and said first output is a current based on a difference between the voltage on the second node and the reference voltage.

10. The voltage boosting circuit of claim 1, wherein said first circuit comprises:

a current source outputting a control current; and

a differential circuit having a first input connected to the reference voltage and a second input connected to the voltage at the second node, said differential circuit having a common-source output for said first output, said first output being controlled by the control current and having a value based on a difference between the voltage on the second node and the reference voltage.
11. The voltage boosting circuit of claim 10, wherein said differential circuit comprises a differential transistor input pair.
12. The voltage boosting circuit of claim 10, wherein said differential circuit comprises cascaded transistors.
13. The voltage boosting circuit of claim 10, wherein said current source controls a rising time of the boosted output voltage.
14. The voltage boosting circuit of claim 1, wherein said first circuit comprises:

a current source outputting a control current; and

an integrator circuit having a first input connected to the reference voltage and a second input connected to the voltage at the second node, said first output being controlled by the control current and having a value based on a difference between the voltage on the second node and the reference voltage.

15. The voltage boosting circuit of claim 14, wherein said current source controls a rising time of the boosted output voltage.
16. A voltage boosting circuit comprising:
 - means for pre-charging a boosting capacitor to a pre-charge voltage;
 - means for boosting the pre-charge voltage at the capacitor;
 - means for tracking a boosted voltage at an output node connected to the boosting capacitor; and
 - means for feeding back a feedback voltage indicative of the boosted voltage to said boosting means.
17. The boosting circuit of claim 16, wherein said pre-charging means comprises a pre-charge circuit.
18. The boosting circuit of claim 16, wherein said boosting means comprises a voltage-to-current converter, said converter having a first input connected to a reference voltage, a second input connected to the feedback voltage, and an output current based on a difference between the reference voltage and the feedback voltage.
19. The boosting circuit of claim 18, wherein said voltage-to-current converter comprises:
 - a current source outputting a control current; and
 - a differential circuit controlled by said control current.

20. The boosting circuit of claim 18, wherein said voltage-to-current converter comprises:
- a current source outputting a control current; and
 - an integrator controlled by said control current.
21. The boosting circuit of claim 16, wherein said tracking means comprises a capacitor.
22. A pixel cell for an imager, said pixel cell comprising:
- a first circuit element connected to a voltage; and
 - a voltage boosting circuit outputting said voltage to said first circuit element, said boosting circuit comprising:
 - a first circuit, said first circuit having a first input connected to a reference voltage and a first output; and
 - a second circuit connected to receive the first output and a pre-charge voltage, said second circuit outputting a boosted output voltage on an output node based on the pre-charge voltage and the first output, said second circuit having a second node connected to a second input of the first circuit, said first circuit using a voltage on the second node and the reference voltage to generate the first output.
23. The pixel cell of claim 22, wherein the voltage on said second node is indicative of the boosted output voltage.

24. The pixel cell of claim 22, wherein the voltage on said second node is indicative of a difference between the boosted output voltage and the pre-charge voltage.
25. The pixel cell of claim 22, wherein the first output is a current based on a difference between the boosted output voltage and the reference voltage.
26. The pixel cell of claim 22, wherein said second circuit comprises a tracking capacitor connected between the output and second nodes, said tracking capacitor producing the voltage at the second node.
27. The pixel cell of claim 22, wherein said second circuit comprises:
 - a first capacitor connected between said pre-charge voltage and a third node connected to the first output; and
 - a fourth capacitor connected between the output node and the second node.
28. The pixel cell of claim 27, wherein said boosting circuit further comprises:
 - a first switch connected between the third node and a ground potential; and
 - a second switch connected between the second node and the ground potential,wherein in a pre-charge phase, said switches are closed to allow the capacitors to be pre-charged to the pre-charge voltage.

29. The pixel cell of claim 28, wherein in a boosting phase, said switches are open, preventing the capacitors from being pre-charged to the pre-charge voltage, said first capacitor being boosted by the first output to cause the boosted output voltage to be present at said output node.
30. The pixel cell of claim 22, wherein said first circuit comprises a voltage-to-current converter circuit and said first output is a current based on a difference between the voltage on the second node and the reference voltage.
31. The pixel cell of claim 22, wherein said first circuit comprises:

a current source outputting a control current; and

a differential circuit having a first input connected to the reference voltage and a second input connected to the voltage at the second node, said differential circuit having a common-source output for said first output, said first output being controlled by the control current and having a value based on a difference between the voltage on the second node and the reference voltage.
32. The pixel cell of claim 31, wherein said differential circuit comprises a differential transistor input pair.
33. The pixel cell of claim 31, wherein said differential circuit comprises cascaded transistors.
34. The pixel cell of claim 31, wherein said current source controls a rising time of the boosted output voltage.

35. The pixel cell of claim 22, wherein said first circuit comprises:
- a current source outputting a control current; and
- an integrator circuit having a first input connected to the reference voltage and a second input connected to the voltage at the second node, said first output being controlled by the control current and having a value based on a difference between the voltage on the second node and the reference voltage.
36. The pixel cell of claim 35, wherein said current source controls a rising time of the boosted output voltage.
37. The pixel cell of claim 22, wherein said first circuit element comprises a reset transistor.
38. The pixel cell of claim 22, wherein said first circuit element comprises a row select transistor.
39. The pixel cell of claim 22, wherein said first circuit element comprises a transfer transistor.
40. The pixel of claim 22, wherein the boosted output voltage is a voltage source of the pixel.
41. A pixel cell for an imager, said pixel cell comprising:
- a first transistor having its gate connected to a control voltage; and
- a voltage boosting circuit outputting said control voltage to said first transistor, said boosting circuit comprising:

means for pre-charging a boosting capacitor to a pre-charge voltage;

means for boosting the pre-charge voltage at the capacitor;

means for tracking a boosted voltage at an output node connected to the boosting capacitor; and

means for feeding back a feedback voltage indicative of the boosted voltage to said boosting means.

42. The pixel cell of claim 41, wherein said pre-charging means comprises a pre-charge circuit.
43. The pixel cell of claim 41, wherein said boosting means comprises a voltage-to-current converter, said converter having a first input connected to a reference voltage, a second input connected to the feedback voltage, and an output current based on a difference between the reference voltage and the feedback voltage.
44. The pixel cell of claim 43, wherein said voltage-to-current converter comprises:
 - a current source outputting a control current; and
 - a differential circuit controlled by said control current.
45. The pixel cell of claim 43, wherein said voltage-to-current converter comprises:
 - a current source outputting a control current; and

an integrator controlled by said control current.

46. The pixel cell of claim 41, wherein said tracking means comprises a capacitor.
47. An imager comprising:
- a pixel cell, said pixel cell comprising a first circuit element connected to a boosted voltage, and a voltage boosting circuit outputting said boosted voltage to said first transistor, said boosting circuit comprising:
- a first circuit, said first circuit having a first input connected to a reference voltage and a first output; and
- a second circuit connected to receive the first output and a pre-charge voltage, said second circuit outputting a boosted output voltage on an output node based on the pre-charge voltage and the first output, said second circuit having a second node connected to a second input of the first circuit, said first circuit using a voltage on the second node and the reference voltage to generate the first output.
48. An imager comprising:
- a pixel cell, said pixel cell comprising a first circuit element connected to a boosted voltage, and a voltage boosting circuit outputting said boosted voltage to said first transistor, said boosting circuit comprising:

means for pre-charging a boosting capacitor to a pre-charge voltage;

means for boosting the pre-charge voltage at the capacitor;

means for tracking a boosted voltage at an output node connected to the boosting capacitor; and

means for feeding back a feedback voltage indicative of the boosted voltage to said boosting means.

49. A method of providing a boosted voltage, said method comprising the steps of:

pre-charging a circuit to a pre-charge voltage;

boosting the pre-charge voltage;

tracking a level of the boosted voltage; and

using a voltage indicative of the level of the boosted voltage to control said boosting step until the boosted voltage reaches a predetermined level.

50. The method of claim 49, wherein the voltage indicative of the level of the boosted voltage is a difference between the boosted voltage and the pre-charge voltage.

51. The method of claim 49, wherein said using step comprises:

comparing a reference voltage to the voltage indicative of the level of the boosted voltage;

generating a current based on a difference between the reference voltage to the voltage indicative of the level of the boosted voltage; and
applying the generated current to the circuit.

52. The method of claim 49, wherein said tracking step comprises obtaining a difference between the pre-charge voltage and the boosted voltage.
53. The method of claim 49, wherein said pre-charging step comprises applying a pre-charge voltage to a first electrode of a capacitor.
54. The method of claim 53, wherein said boosting step comprises applying a current to a second electrode of the capacitor.
55. A method of manufacturing a voltage boosting circuit, said method comprising:

providing a voltage-to-current converter circuit;

connecting a first input of the voltage-to-current converter to a reference voltage;

providing a capacitive boosting circuit;

connecting an input of the capacitive boosting circuit to an output of the voltage-to-current converter circuit;

connecting the input of the capacitive boosting circuit to a pre-charge voltage source; and

connecting an output of the capacitive boosting circuit to a second input of the voltage-to-current converter circuit.

56. The method of claim 55, wherein the capacitive boosting circuit comprises a tracking capacitor.

57. The method of claim 55, wherein said step of providing a capacitive boosting circuit comprises:

providing a first capacitor connected between the pre-charge voltage source and a node connected to the output of the voltage-to-current converter; and

providing a second capacitor connected between an output node and a node connected to the second input of the voltage-to-current converter.

58. The method of claim 55, wherein said step of providing a voltage-to-current converter comprises:

providing a current source outputting a control current; and

providing an integrator circuit having a first input connected to the reference voltage and a second input connected to the output of the capacitive boosting circuit.

59. The method of claim 55, wherein said step of providing a voltage-to-current converter comprises:

providing a current source outputting a control current; and

providing a differential circuit having a first input connected to the reference voltage and a second input connected to the output of the capacitive boosting circuit.